DRAFT

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Carbon Amendment Trial

May CAG, 2018

Agenda

- Background
- Field Evaluation
- Summary

Why trial carbon amendments for T. River floodplain?

- For non maintained areas, remediation can have a dramatic impact on the ecology in natural areas
- Clean-up is voluntary in the FP and property owners may decline remediation due to the potential impacts of the remedy on their property
- Carbon may give them another option that would reduce exposure potential while limiting impact on their property and the ecosystem

Carbon Uses - Used in every day life

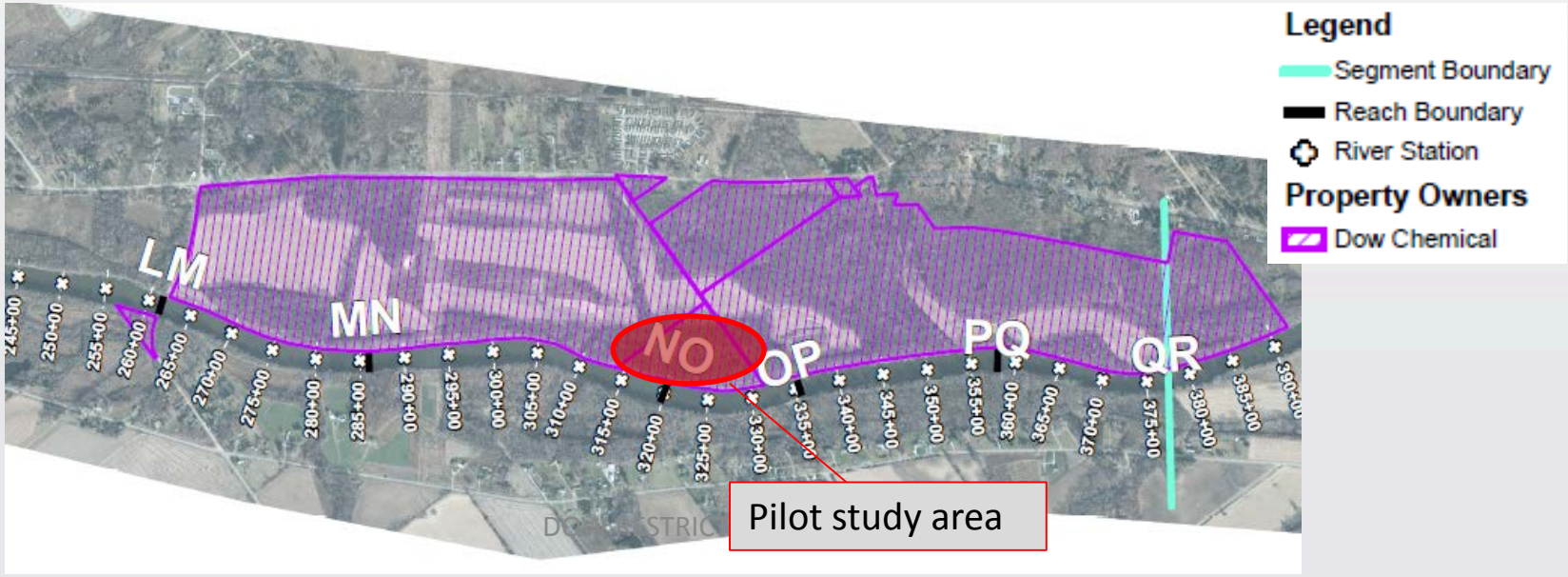
- Filtration
  - Home water filtering systems
  - Air purification
  - Distilled alcoholic beverages
- Medical Uses

T. River Carbon Amendment Trial Overview

- Perform trial to evaluate carbon amendment in the floodplain:
  - Can a practical approach be used to apply carbon into remote and wooded areas?
  - Can activated carbon in the field reduce the exposure potential?
  - Performed both a lab trial and a field trial using contaminated floodplain soils

Field Study Design

- Initiated during the fall of 2015 on Dow property
- Area with elevated TEQ



Field Study: Activated Carbon

- Types
  - Granulated activated carbon (GAC)
  - Powdered activated carbon (PAC)
- AC concentrations (over top inch of soil)
  - 0.5%
  - 1%
  - 2%

Application Methods

- Aerial application
  - Helicopter – granulated carbon only
- Ground application
  - Wet Slurry application (hydro-seeder)

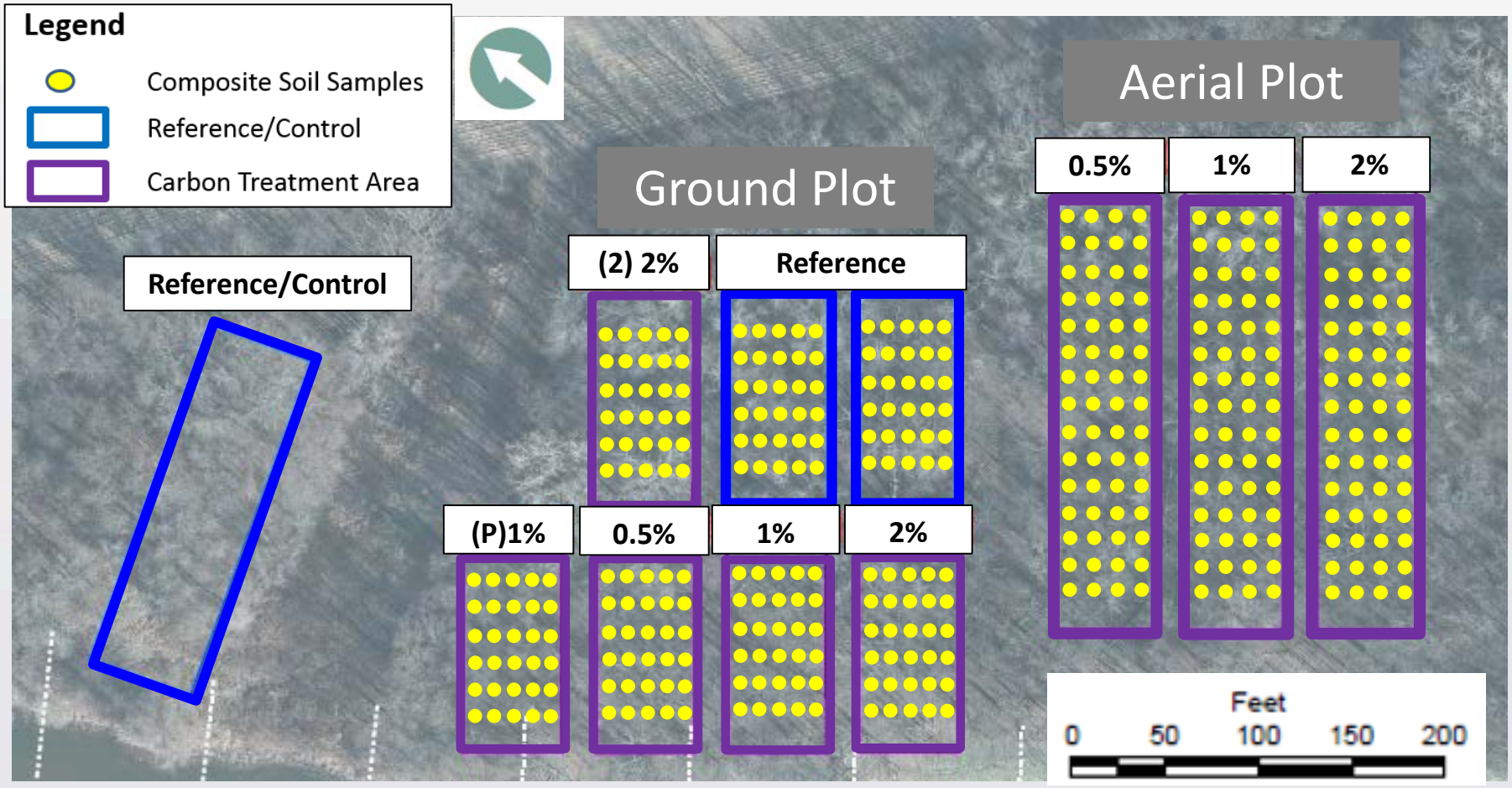
Application of Granular Carbon Over Plot Area

Granular Carbon on Soil Surface – Immediately following aerial application

Ground based Application

Ground based Application

Field Plots



Notes:

- (P) Indicates powder application noted – all others are granulated
- (2) Indicates duplicate location for 2% granulated carbon placement

Summary of Application Method

- Aerial application
  - Helicopter worked very well
  - Due to the small size it took many trips
  - Very good method for wooded areas

- Ground application
  - Worked well
  - Would be difficult to get into the heavily wooded areas, especially large areas.

Effectiveness of activated carbon to reduce the exposure potential

- Analyze floodplain soils with and without carbon amendments to determine if the carbon reduces the available D/Fs

- If the available D/Fs are reduced, this would indicate exposure potential is reduced

Soil Sampling Method

- Incremental Composite Samples (ICS)
  - 60 increments per sample area
  - 1 “ Deep cores
- Perform routine sampling of the amended floodplain soils and a control (non-amended floodplain soils)
  - 2 samples in 2015
  - 3 samples in 2016
  - 2 samples in 2017

Effectiveness Summary

- 7 floodplain sampling events have been performed using the ICS sampling Method
- If 1% or greater of carbon is used, results to date indicates ~50% reduction in exposure potential
- Similar results were found in the lab

Future Plans:

- Continue to monitor the test area
- Consider additional test areas

Questions/Comments